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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,287	06/05/2001	Tomio Sugiyama	2635-16	4759

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EXAMINER

TUNG, TA HSUNG

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 09/09/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,287

Applicant(s)

SUGIYAMA, T.

Examiner

T. TUNG

Group Art Unit

1753

Paper No. 9

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- ☒ Responsive to communication(s) filed on 9/14/03
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1-6, 13 is/are pending in the application.
- Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-6, 13 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☐ All ☐ Some* ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. _____
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☐ Interview Summary, PTO-413
- ☐ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Other _____

Office Action Summary

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Claims 1, 2, 4-6, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase etal 4,798,693 in view of Radford etal 3,843,400 or Kobayashi etal 4,961,835.

Applicant argues that none of the references discloses the silica-containing bonding boundary between the zirconia layer and the alumina layer.

This argument is not persuasive. It is evident that, when silica is present in the zirconia layer, laminating the zirconia and alumina layers by sintering would inherently create the silica-containing bonding boundary between the two layers. This is what is disclosed by applicant. Certainly, there has been no showing, or even an argument, that the formation of the silica-containing bonding boundary requires some treatment beyond laminating/sintering.

There is ample motivation for adding silica to the zirconia of Mase, because Radford teaches silica to be a sintering aid to lower the sintering temperature of zirconia (see col. 2, last line) and Kobayashi teaches the addition of silica to give zirconia an advantageous coefficient of thermal expansion, better low temperature operating characteristics and better life characteristics (see col. 2, lines 58-66; col. 4, lines 11-51; Table 2 in column 5). Once silica is added to the zirconia of Mase, there would inherently be a silica-containing bonding boundary when the zirconia and alumina layers are laminated by sintering.

At most, applicant has discovered an additional benefit from a combination that is already obvious. Such a benefit, whether expected or not, can not negate an already obvious combination.

In regard to new claim 13, see col. 4, line 65 of Mase.

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Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Radford et al or Kobayashi et al and Ishiguro et al.

Applicant appears to merely argue that the additional reference (Ishiguro) does not cure the deficiencies of the other references. This is not a separate and distinct argument. Just for emphasis, it should be noted that Ishiguro is merely relied upon to show the bonding of a zirconia layer and an alumina layer at an undulating boundary in order to strengthen the bond between the two layers. This feature would have been obviously desirable for Mase as well.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Radford et al or Kobayashi et al and Japan 9-26409.

Applicant appears to merely argue that the additional reference (Japan) does not cure the deficiencies of the other references.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Radford et al or Kobayashi et al and Japan 08-114571.

Applicant again appears to merely argue that the additional referenec (Japan) does not cure the deficiencies of the other references.

For all the rejections, applicant contends that there must be some suggestion to combine the references.

This contention is seen to be without merit, if applicant is stating that the references must make a positive suggestion to combine them. To properly combine references under 35 USC 103, there is no requirement that the references make an affirmative suggestion for combination. All

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that is required is sufficient motivation to combine the references, and that motivation can come from the references themselves or from what would have been obvious to one of ordinary skill in the art. In the instant case, since Radford and Kobayashi teaches benefits for adding silica to a zirconia solid electrolyte, the motivation for combining the references is derived from the references themselves.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-6, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Mase et al 4,798,693.

As discussed in the previous Office action, Mase discloses a zirconia solid electrolyte layer being laminated to an alumina insulating layer by sintering.

According to the discussion at col. 2, lines 18-19, 45-51 of the newly-cited Hayakawa patent 5,122,487, a yttria-stabilized zirconia solid electrolyte inevitably contains silica as an impurity (e.g. up to about 0.2%). If so, the yttria-stabilized zirconia electrolyte of Mase must contain silica as an impurity. Since 0.2% is slightly more than the 0.15% silica disclosed by applicant (page 13, line 5 of the specification) to be sufficient to create a silica-containing bonding

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boundary, it is evident that in the Mase device, there would inherently be such a bonding boundary when the zirconia and alumina layers are laminated by sintering.

It should be noted that Hayakawa is not being relied upon here as an anticipatory reference but merely to substantiate the examiner's position that the zirconia in the Mase patent has silica as an impurity.

In regard to claim 5, the coefficients of expansion for both zirconia and alumina are known and would inherently have a difference less than 2×10^{-6} .

As for claim 6, the sintering contraction difference recited therein must be inherent of the patent, since all the materials in Mase are the same as those employed by applicant.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Radford et al.

This claim differs by calling for the presence of calcia in the bonding boundary.

Radford discloses calcia to be equivalent to yttria as a stabilizer for zirconia. See col. 2, line 58. It would have been obvious for Mase to adopt a zirconia electrolyte with calcia as the stabilizer in view of Radford, since the substitution of art-recognized equivalents is within the skill of the art.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Ishiguro et al.

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This claim differs by calling for the zirconia and the alumina layers to be joined at a boundary that is undulated. As discussed before in the previous Office action, that is rendered obvious by Ishiguro.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Japan 9-26409.

This claim differs by calling for a difference in coefficients of expansion of the zirconia layer and the alumina layer to be less than 2×10^{-6} . As discussed before in the previous Office action, that is rendered obvious by Japan '409 in order to minimize thermal stress.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Japan 08-114571.

This claim differs by calling for a sintering contraction coefficient difference between a zirconia layer and an alumina layer to be less than 3%. As discussed in the previous Office action, that feature is rendered obvious by Japan '571.

Claims 1, 4-6, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Hayakawa et al.

Mase has been discussed previously as disclosing a device with a zirconia layer laminated to an alumina layer by sintering. If Mase's zirconia layer were construed as not to contain silica, applicant's claims differ by calling for a silica-containing bonding boundary between the zirconia layer and the alumina layer.

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Hayakawa discloses a zirconia solid electrolyte containing up to 0.2% silica as an impurity. See col. 2, lines 13-51. It would have been obvious for Mase to adopt the zirconia electrolyte of Hayakawa as its zirconia solid electrolyte, because of its good mechanical properties and high withstand voltage (see the abstract of Hayakawa). The silica would inherently create a silica-containing bonding boundary in Mase when the layers are sintered together. The fact that Hayakawa desires to rid its zirconia of silica impurity is irrelevant, because the patent makes it clear that silica is inevitably present in its zirconia.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Hayakawa et al and Radford et al.

This claim further differs by calling for the presence of calcia in the bonding boundary. As discussed before, Radford shows the equivalence of yttria and calcia as a zirconia stabilizer. It would have been obvious for Mase to adopt a calcia stabilizer.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Hayakawa et al and Ishiguro et al.

This claim further differs by calling for the boundary between the zirconia and the alumina layers to be undulating. As discussed before, that is rendered obvious by Ishiguro.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Hayakawa et al and Japan 9-26409.

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This claim further differs by calling for the difference in the coefficients of expansion of the zirconia layer and the alumina layer to be less than 2×10^{-6} . As discussed before, that is rendered obvious by Japan '409.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mase et al '693 in view of Hayakawa et al and Japan 08-114571.

This claim further differs by calling for a sintering contraction coefficient difference between the zirconia layer and the alumina layer to be less than 3%. As discussed before, that is rendered obvious by Japan '571.

The examiner can be reached at 703-308-3329. His supervisor Nam Nguyen can be reached at 703-308-3322. Any general inquiry should be directed to the receptionist at 703-308-0661. A fax number for TC 1700 is 703-872-9310.



Ta Tung

Primary Examiner

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